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Nuclear

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August 6, 2003

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Three Mile Island Nuclear Station, Unit No. 1
Facility Operating License No. DPR-50
NRC Docket No. 50-289

Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors"

Reference: NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003

On June 9, 2003, the Nuclear Regulatory Commission (NRC) issued Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," (Reference). This Bulletin addressed issues associated with potential post-accident debris blockage concerns impeding or preventing the operation of the emergency core cooling system (ECCS) and containment spray system (CSS) in the recirculation mode at pressurized water reactors (PWR) in the event of a loss-of-coolant-accident (LOCA) or other high energy line break (HELB) accidents for which sump recirculation is required by 10 CFR 50.46(b)(5).

The Bulletin requires the requested information be provided within 60 days of the date of the Bulletin's issuance. These responses are due to the NRC by August 8, 2003. The NRC intends to use this information in order to verify compliance with regulations and to ensure that any interim risks associated with post-accident debris blockage are minimized while evaluations to determine compliance proceed. In accordance with NRC Bulletin 2003-01, Exelon Generation Company, LLC (Exelon) and AmerGen Energy Company, LLC (AmerGen), hereby provide the requested response.

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Specifically, Bulletin 2003-01 requests licensees to either: 1) State that the ECCS and CSS recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the NRC Bulletin and are in compliance with 10 CFR 50.46(b)(5) and all existing applicable regulatory requirements (Option 1); or 2) Describe any interim compensatory measures that have been or will be implemented to reduce the risk which may be associated with the potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance has been completed (Option 2).

Exelon and AmerGen are providing responses to Bulletin 2003-01 in accordance with Option 2.

Exelon and AmerGen have performed assessments of Braidwood and Byron Station, Units 1 and 2, and Three Mile Island Nuclear Station, Unit No. 1, susceptibility to loss of recirculation cooling due to sump screen blockage. These qualitative assessments consider the guidance available in Draft Regulatory Guide 1107 (DG-1107), "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," and NUREG/CR-6808, "Knowledge Base for the Effect of Debris on Pressurized Water Reactor Emergency Core Cooling Sump Performance," which are referred to in the NRC Bulletin. Exelon / AmerGen have concluded that existing process controls, in conjunction with planned compensatory measures described in this response, are appropriate interim measures to reduce overall plant risk pending final resolution of this issue under Generic Safety Issue (GSI) 191, "Assessment of Debris Accumulation on PWR Sump Performance."

Attachment 1 provides the AmerGen response for Three Mile Island Nuclear Station, Unit No. 1. Attachment 2 provides the Exelon response for Braidwood Station, Units 1 and 2, and Byron Station, Units 1 and 2.

Commitments made in this document are listed in Attachment 3. Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.

If any additional information is needed, please contact us at (610) 765-5664.

I declare under penalty of perjury that the foregoing is true and correct.

Respectfully,

08-06-2003
Executed on

Michael P. Gallagher

M. P. Gallagher
Director-Licensing & Regulatory Affairs
AmerGen Energy Company, LLC
Exelon Generation Corporation, LLC

Attachments:
1. Three Mile Island Nuclear Station, Unit No. 1 (TMI-1) Response to NRC Bulletin 2003-01
2. Braidwood and Byron Stations, Units 1 and 2 Response to NRC Bulletin 2003-01
3. Regulatory Commitments

cc: Regional Administrator – NRC Region I
Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Braidwood Station
NRC Senior Resident Inspector – Byron Station
NRC Senior Resident Inspector – Three Mile Island, Unit 1
File No. 02046

Attachment 1

Three Mile Island Nuclear Station, Unit No. 1 (TMI-1)
Response to NRC Bulletin 2003-01

Background

Three Mile Island Nuclear Station, Unit No. 1 (TMI-1) containment sump is located outside the primary shield. The sump screen area is 214 square feet and it is 3.5 feet below the floor level. The sump screen will be fully submerged at the time of Emergency Core Cooling System (ECCS) suction switchover, which would occur no sooner than 28 minutes after the loss of coolant accident (LOCA) in the limiting design basis scenario.

The fibrous insulation inside containment is the Nukon insulation on the pressurizer and steam generator head areas. This covers 1818 square feet, so the estimated total volume of Nukon insulation is 600 cubic feet. The remainder of the insulation is the reflective metal type. The total surface area of service level 1 coatings within containment is 481,000 square feet, and the total surface area of unqualified coatings is 428 square feet.

The net positive suction head (NPSH) margins for the two (2) low-pressure injection (LPI) pumps are 1.5 and 2.1 feet, and the NPSH margins for the two (2) containment spray pumps are 3.14 and 3.50 feet. These margins assume the maximum analyzed flows in the sump-recirculation mode and take no credit for containment overpressure during the event. In the case of the maximum hypothetical accident, 3.7 hours of containment spray operation is required. For less severe events, emergency procedures allow securing containment spray when pressure and radiation levels are reduced. However, in most LOCA scenarios, containment spray will not be actuated.

In TMI-1's configuration, all large-break LOCA's would occur within the primary shield. Therefore, the zone of influence for debris generated as a result of a large-break LOCA would be inside the primary shield. The drain paths from within the primary shield wall include two 4-inch diameter floor drains and a personnel door containing a grating of approximately three square feet. A 6-inch high lip and a 180 square foot trash rack (walkway grating) at the top of the sump would further prevent any of the heavier/larger debris from entering the sump.

The other potential break location is outside the primary shield and in the vicinity of the containment sump. A break in this portion of the system is restricted to the letdown line size, which is in the small-break LOCA category. The flow path from a line break in this area would be a more direct route to the containment sump. Additionally, there is no Nukon insulation or significant amount of other fibrous debris material in this area.

A qualitative assessment for the potential impact of debris blockage on emergency sump recirculation at TMI-1 has been performed. This assessment considered the guidance available in Draft Regulatory Guide 1107, Revision 3, and NUREG/CR-6808. The design basis calculations, which determine the available NPSH margin for the LPI pumps and containment spray pumps were reviewed along with the downstream effects of particulate through the sump screen.

These assessments, in conjunction with review of the ECCS sump configuration, containment layout, quantity and location of insulation, coatings and other potential debris sources, were used to determine the level of risk for post LOCA sump screen blockage. Based upon the results, TMI-1 plans to supplement existing programs and procedures with compensatory measures deemed appropriate to reduce the overall plant risk following a design basis LOCA event.

In response to Option 2 of Bulletin 2003-01, the following information is provided: 1) the interim compensatory measures that have been implemented; 2) planned interim compensatory measures that will be implemented, their basis, and schedule; and 3) interim compensatory measures not being implemented.

Prior to the issuance Bulletin 2003-01, AmerGen recognized the necessity to have processes and controls in place to prevent the impact of debris blockage of containment sumps in recirculation operations following a high-energy line break (HELB). For example: containment sump and containment closeout inspections after a refueling outage, verification that containment is free of loose debris prior to establishing containment integrity, visual inspection of the emergency sump screens, etc. These measures, although prior to the issuance of Bulletin 2003-01, are consistent with the compensatory measures identified in Bulletin 2003-01 for preventing potential sump clogging. Since these measures are not considered "interim" measures, as discussed in the bulletin, they are not identified as such in our response. They have been implemented through approved station procedures. They are discussed in more detail in Section III, "Interim Compensatory Measures NOT Being Implemented," providing basis as to why the suggested measures are not required in response to Bulletin 2003-01.

I. Interim Compensatory Measures to Reduce Risk That Have Been Implemented

1. Operator training on indications of and responses to sump clogging

Blockage of the ECCS sump screen will result in degraded NPSH margins for the LPI pumps and the containment spray pumps. Degraded NPSH below the required NPSH will result in pump cavitation. The operators are trained to recognize and respond to pump cavitation.

The applicable emergency operating procedures have been revised to include specific ECCS throttling criteria based on indications of ECCS flow restriction. Procedures for ECCS sump recirculation were modified to include additional details on how to identify pump cavitation. The indications available to the operator include degraded or oscillating flow, discharge pressure, or pump motor current, or increased pump vibration. These indications are all available in the control room. If these symptoms appear while operating in the sump-recirculation mode, the procedure directs throttling of LPI and containment spray flows to values that do not reduce the containment spray or LPI system performance below analyzed limits. If the symptoms persist, LPI will be throttled further as necessary to prevent pump damage and complete loss of function. These procedure changes were implemented based on guidance provided by the Babcock and Wilcox Owners Group (BWOG). These actions can all be taken from the control room. The decision to take action is based on both qualified and unqualified instruments. LPI flow will be maintained above a value ensuring adequate core cooling as long as pump damage is not imminent. The containment spray system will only be shutdown after assessing containment pressure and radiation levels. The current cycle of operator training includes the new ECCS throttling criteria described above.

II. Planned Interim Measures That Will be Implemented

1. Operator training on indications of and responses to sump clogging

Licensed Operator Requalification Training is in progress and includes enhanced ECCS throttling criteria. All licensed operators will complete classroom training by August 31, 2003.

2. More aggressive containment cleaning and increased foreign material controls

The plant will improve the containment closeout inspection procedure to specifically address dirt, dust, and small debris accumulation. This will be completed by September 30, 2003. This schedule allows the procedural improvements to be used in the plant's next refueling outage. Earlier completion of these procedure changes would not yield any additional benefit and is consistent with the relatively low risk of additional debris being introduced to containment prior to the refueling outage.

TMI-1's containment has been designated as a foreign material exclusion (FME) area during plant operation. This was a significant step in ensuring that loose material that could result in debris to the ECCS sump screens is properly managed inside containment.

The plant's focus on maintaining containment cleanliness is intended to meet the company's housekeeping standards and minimize the spread of contamination. It also ensures that there will be no loose debris in containment that could be transported to the ECCS sump. Plant personnel document this with a specific containment closeout inspection procedure. If necessary, additional cleaning and housekeeping activities are performed prior to completing this procedure. The plant staff has determined that this procedure should be enhanced to better focus on sources of sump debris that could affect the ECCS sump.

3. Ensuring containment drainage paths are unblocked

The plant will develop a specific procedure for cleaning and inspecting the floor drains in containment and will coordinate this work with the containment closeout procedure. This will be completed by September 30, 2003. This schedule allows the procedural improvements to be used in the plant's next refueling outage. Earlier completion of these procedure changes would not yield any additional benefit and is consistent with the relatively low risk of additional debris being introduced to containment prior to the refueling outage.

TMI-1's configuration is such that all large-break LOCA's would occur inside the primary shield. The key drainage paths from there to the sump, which is located outside of the primary shield, are via the 4-inch lines from two floor drains and through an approximately 3 square-foot grating in the lower half of a locked personnel door to the primary shield. These openings are adequate to allow flow to the ECCS sump.

III. Interim Compensatory Measures NOT Being Implemented (Including Justification)

1. Procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS intermittently)

This approach, described above, would require a change in what has become the industry-wide strategy for responding to accident conditions, which uses "symptom-based" procedures. Securing or reducing ECCS flows, as a preemptive measure is contrary to the philosophy that has been ingrained in the operating crews and would require making the assumption that excessive ECCS screen blockage was otherwise imminent.

In the analysis area, there may be a trade-off between reduced ECCS flow and the likelihood of maintaining at least the minimal core and containment cooling for extended time periods. Successful application of this approach would require more detailed analysis. Without additional detailed analysis, reduction of ECCS flows could take the plant outside its design basis and may even make plant recovery more difficult.

To be effective in delaying the switchover to containment sump recirculation, operator actions to reduce the borated water storage tank (BWST) drawdown rate must be taken in the first few minutes of an accident. This introduces a significant opportunity for operator errors based on other actions that are required during this time frame. Any new operator actions at this point in accident scenarios would result in increased risk due to the potential for operator error.

The emergency operating procedures contain other ECCS throttling criteria that would be used for situations not directly related to sump screen blockage. Examples of these include:

- If the High-Pressure Injection (HPI) throttling criteria is satisfied prior to sump switchover, then HPI pumps are throttled or secured.
- If containment spray actuates, and containment pressure returns to normal levels, and containment radiation levels are not excessive, then containment spray will be secured.

Since delaying switchover to ECCS sump recirculation would have the operators prematurely securing or reducing ECCS flows without evidence of sump clogging, there is no overall resulting risk improvement.

2. Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment

Since NPSH loss due to excessive sump screen clogging is not likely and the time to ECCS switchover will be at least 28 minutes, the plant's current approach is considered adequate.

Implementing this measure would involve additional risks associated with:

- reducing boron concentration,
- having excessive water level in the containment basement, and
- the long-term effects of abnormal pH of the water inside containment.

These more than offset the reduced core cooling risk that could result from adding what would be only a limited amount of water to the BWST.

The plant's current design and analyses do not support an appropriate means to provide an alternate water source for ECCS and containment spray. Present systems design does not include a source and motive force, which could be relied upon to refill the BWST or otherwise provide a suction source to LPI and containment spray at a rate sufficient to maintain the minimum required LPI flow of 2500 gpm. Where non-safety equipment could be used to transfer borated water from the spent fuel pool to the BWST, there is a very small margin in the present containment maximum water level analysis. Therefore, no new actions have been taken or planned.

3. Ensuring sump screens are free of adverse gaps and breaches

The existing procedures for inspection of the ECCS sump adequately address concerns related to the physical condition of the screens.

The ECCS sump is visually inspected at TMI station once every 24 months (i.e., during a refueling outage).

The ECCS sump inspection procedure includes steps to verify that the sump screen mesh is intact and that no gap exceeds the size of the screen opening.

ATTACHMENT 2

Braidwood and Byron Stations, Units 1 and 2
Response to NRC Bulletin 2003-01

Background

At Braidwood and Byron Stations, two Emergency Core Cooling Systems (ECCS) sumps are provided for each unit. Each sump serves one train of the ECCS and the Containment Spray (CS) System. Three screens protect the suction intake lines from the sumps (one per train). One middle screen and one inner screen are installed on each sump. One outer screen, with a total surface area of approximately 260 square feet, encloses the middle and inner screens for both sumps. The outer screen extends vertically approximately 4 feet above slab elevation 377 feet, which is the top of the sump. A 6-inch high steel plate is installed along the bottom edge of the 3/8-inch outer screen.

The thermal insulation used on reactor coolant piping and on the exterior of the reactor vessel is the reflective metal insulation (i.e., stainless steel) type (RMI). Fiberglass blankets, covered with stainless steel sheathing, have been added to the upper section of the Unit 1 steam generators and associated piping at Braidwood and Byron Stations as part of the Steam Generators Replacement Project. The fiberglass insulation has been evaluated and determined to not impact the ECCS sumps. Although the insulation may be dislodged from the steam generators, it will not be transported to the containment floor as the grating at elevation 401 feet blocks the path. Consequently, RMI is the only insulation type that has the potential to reach the ECCS sumps following a loss-of-coolant-accident (LOCA).

Published data from the Nuclear Regulatory Commission (NRC) as well as within the nuclear industry indicates that, when compared to other insulation types, RMI represents a lower risk to the net-positive-suction-head (NPSH) margins for pumps taking suction from the sump. Debris from RMI requires a higher fluid bulk velocity to be transported to the sump. If RMI fragments reach the sump screen, these fragments typically form a loose debris bed on the screen that induces low head losses. Considering this, in conjunction with the relatively large surface area of the sumps outer screen, the screen blockage potential due to RMI is minimal.

In response to a LOCA, the residual heat removal (RHR), centrifugal charging, and safety injection pumps automatically start upon receipt of a safety injection signal. These pumps inject to the reactor coolant system, taking suction from the refueling water storage tank (RWST). The CS pumps start automatically when the containment pressure set point is reached and also take suction from the RWST. The switchover to the ECCS sumps as suction source to the RHR pumps is initiated when the RWST water level decreases to approximately 47%. The CS pumps suction source is switched over to the ECCS sumps when the RWST water level decreases further, to approximately 12%. Considering the delay between the onset of the accident and the initiation of the recirculation mode, and recognizing that initial flow from the ECCS sumps is exclusively to the RHR pumps, heavier debris will likely settle to the containment floor and not reach the sump screens.

Design basis analyses have evaluated the effect on the ECCS sumps of postulated failed, unqualified coatings. The results of the analyses show the pressure drop across the outer and inner screens is less than one foot. This pressure drop is accounted for in the evaluations of the NPSH margins for the RHR and CS pumps.

The calculated NPSH margin for the pumps taking suction from the ECCS sumps exceeds 3 feet for the CS pumps and exceeds 4.5 feet for the RHR pumps. This analysis does not take credit for the water level on the containment floor above elevation 377 feet, assumes

conservatively high pump flows, and does not credit containment overpressure (i.e., containment pressure above the vapor pressure of the sump liquid).

A qualitative assessment for the potential impact of debris blockage on ECCS sump recirculation at Braidwood and Byron Stations has been performed. This assessment considered the guidance available in Draft Regulatory Guide 1107 (DG-1107), "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," and NUREG/CR-6808, "Knowledge Base for the Effect of Debris on Pressurized Water Reactor Emergency Core Cooling Sump Performance." The design basis calculations, which determine the available NPSH margin for the RHR and CS pumps, were reviewed along with the impact of downstream effects of particulate through the sump screen.

This assessment, in conjunction with review of the ECCS sump configuration, quantity and location of insulation, coatings and other potential debris sources, and containment layout, was used to determine the level of risk for post-LOCA sump screen blockage. Based upon the results, Braidwood and Byron Stations plan to supplement existing programs and procedures with compensatory actions deemed appropriate to reduce the overall plant risk following a design basis LOCA event.

In response to Option 2 of Bulletin 2003-01, the following information is provided: 1) the interim compensatory measures that have been implemented; 2) planned interim compensatory measures that will be implemented, their basis, and schedule; and 3) interim compensatory measures not being implemented.

Prior to the issuance of Bulletin 2003-01, Exelon recognized the necessity to have processes and controls in place to prevent the impact of debris blockage of containment sumps in recirculation operations following a high-energy line break (HELB). For example: containment sump and containment closeout inspections after a refueling outage, verification that containment is free of loose debris prior to establishing containment integrity, visual inspection of the emergency sump screens, etc. These measures, although prior to the issuance of Bulletin 2003-01, are consistent with the compensatory measures identified in the Bulletin 2003-01 in preventing potential sump clogging. Since these measures are not considered "interim" measures, as discussed in the Bulletin, they are not identified as such in our response. They have been implemented through approved station procedures. They are discussed in more detail in Section III, "Interim Compensatory Measures NOT Being Implemented," providing basis as to why the suggested measures are not required in response to Bulletin 2003-01.

I. Interim Compensatory Measures to Reduce Risk That Have Been Implemented

Based on assessments completed and reviews of the ECCS sump configuration, quantity and location of insulation, coatings and other potential debris sources, and containment layout, no "interim" measures have been implemented PRIOR to our response to Bulletin 2003-01.

II. Planned Interim Measures that Will be Implemented

1. Operator training on indications of and responses to sump clogging

A required reading package will be given to Shift Operations personnel. The reading package will reinforce training on indications available to operators and actions to respond to a post-LOCA ECCS sump screen blockage event. Reading packages will be completed by September 8, 2003.

The reading package will reinforce training on indications available to operators and actions to respond to a post-LOCA ECCS sump screen blockage event. Training will discuss symptoms of pump cavitation (i.e., flow reduction, oscillating amps and discharge pressure) and will reinforce the expected action to shutdown the affected pump(s). If the pumps taking suction from the ECCS sumps are shutdown, the loss of recirculation capability will result in entering an existing procedure that addresses this condition. This procedure includes steps to delay depletion of the RWST by adding make-up flow and reducing outflow. Make-up flow is provided from the reactor coolant make-up system. RWST outflow is reduced by establishing minimum ECCS flows required to remove decay heat and by operating the minimum required number of CS pumps based on specific containment pressure values and on the numbers of reactor containment fan coolers that are in operation.

Operator simulator training will be completed in the third quarter of 2003 for Braidwood and in the fourth quarter of 2003 for Byron. These dates were selected based upon the current training cycle under development at each station.

The simulator scenario that results in a complete loss of RHR will be used. The end state, loss of recirculation capability, is the same as in an ECCS sump screen blockage scenario. As part of this training, NRC Bulletin 2003-01 is included as a debrief topic.

2. More Aggressive Containment Cleaning and Increased Foreign Material Controls

To further reduce the potential for latent debris inside containment that could be adverse to the ECCS sump screens, the containment loose debris inspection procedures will be enhanced by incorporating specific references to potential debris sources (such as duct tape, masking tape, paper/plastic labels, stickers, excess sealant materials, foam ear plugs, Herculite, and insulation). In addition, Braidwood will revise the containment access procedure to ensure consistent implementation of the loose debris inspection procedure at both stations. The procedure changes will be in place for both stations prior to their next refueling outages. Braidwood procedure changes are scheduled to be complete by October 31, 2003 and Byron procedure changes are scheduled to be complete by September 15, 2003. These dates were selected due to the low risk imposed for entry prior to each refueling. Earlier completion of these procedure changes would not yield any additional benefit.

3. Ensuring containment drainage paths are unblocked

Two access openings exist at containment elevation 377 feet to control access to inside missile barrier (IMB) from outside missile barrier (OMB). The size of each opening is a nominal 3 feet by 7 feet. A screen door is installed at each location with a 1.5-inch diamond mesh. The containment loose debris inspection procedure will be enhanced to add the IMB access openings to the list of items that are inspected when a containment entry is made to elevation 377 feet. The procedure changes will be in place for both stations prior to their next refueling outages. Braidwood procedure changes are scheduled to be complete by October 31, 2003 and Byron procedure changes are scheduled to be complete by September 15, 2003. These dates were selected due to the low risk imposed for entry prior to each refueling. Earlier completion of these procedure changes would not yield any additional benefit.

III. Interim Compensatory Measures NOT Being Implemented (including justification)

1. Ensuring sump screens are free of adverse gaps and breaches

Braidwood and Byron Stations have reviewed the existing procedures for inspection of the ECCS sumps and concluded they adequately address concerns related to the physical condition of the screens.

The ECCS sumps are visually inspected at Braidwood and Byron Stations once every 18 months (i.e., during a refueling outage) in accordance with the requirements of Technical Specifications 3.5.2 and 3.5.3.

Surveillance procedures include steps to verify the sump screen mesh is intact and no gaps are present that exceed the size of the screen mesh opening.

2. Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the core and spray into the containment atmosphere

RWST refill is not assumed in the safety analyses, and introduces the potential for higher containment flood levels with the resulting loss of instrumentation and equipment inside containment.

However, for both Braidwood and Byron Stations, guidance is given in emergency procedures to address RWST refill once it has been determined that a complete loss of emergency coolant recirculation capability exists. These procedures are emergency contingency action procedures and supplement the plant emergency and event specific procedures by providing recovery actions for low probability or unique event sequences. These procedures include instructions to provide make-up flow to the RWST from the reactor coolant make-up system. These procedures also provide guidance to make-up directly to the RCS with the centrifugal charging pumps, taking suction from the volume control tank, using borated water from the boric acid storage tanks.

3. **Procedural Modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool containment and reactor core, and operating CSS intermittently)**

Current procedural practices, accepted industry wide, direct the maximization of ECCS injection flow, especially in the most critical, early stages of the event when decay heat is at its highest value. Reducing injection flow at this time could affect these accidents adversely by reducing core cooling.

It would be inappropriate to implement the suggested practice of delaying the initiation of cold leg recirculation by reducing ECCS flow during the injection phase of design basis events. Braidwood and Byron Stations will monitor Westinghouse Owners Group (WOG) activities to address ECCS sumps sump blockage and will consider implementation of any issued guidance.

These actions would be inconsistent with the overall WOG Emergency Response Guidelines (ERG) philosophy. The WOG ERGs are symptom-based procedures for the monitoring of plant parameters. To avoid the risk of taking an incorrect action for an actual event, the WOG ERGs do not prescribe contingency actions until symptoms that warrant those contingency actions are identified.

A qualitative assessment of Braidwood and Byron Stations indicates that significant blockage of the ECCS sumps screens is unlikely. Revision to emergency procedures that are used to respond to additional accidents other than a LOCA would affect the overall timing of the response sequence and carries the potential to significantly decrease plant nuclear safety by adversely affecting the response to other accidents.

4. **More aggressive containment cleaning and increased foreign material control**

Braidwood and Byron Stations have determined that additional measures described in Section II.2, in conjunction with the existing programs and procedures, are adequate to minimize the risk of sump screen blockage due to foreign material introduced inside containment. The discussions below describe the existing measures in place at both Braidwood and Byron Stations for foreign material control inside containment.

Both Braidwood and Byron Stations have procedures to verify containment is free of loose debris prior to establishing containment integrity. At Byron, these procedures are also applicable to any containment entry after containment integrity has been established. At Braidwood, a separate procedure requires a visual inspection to verify no loose debris is present in areas where work is performed for containment entry during modes 1 through 4. The objective of these procedures is to verify that no loose debris is present in containment that could be transported to the ECCS sumps.

Braidwood and Byron Stations' FME program provides the necessary requirements and guidance to prevent and control the introduction of foreign material into structures, systems, and components. It also controls the investigation and recovery actions when FME integrity is lost or unexpected material is discovered. FME controls are required to be established any time a system/component is opened for maintenance, regardless of size. The FME requirements are documented in each work package. The work planner determines the foreign material exclusion area (FMEA) and any special requirements based on the planned work activity or task. This area requires authorization for entry.

Some of the more relevant FMEA work practices identified in the procedure also support the objective of minimizing debris that could affect the ECCS sumps screens. These work practices are given below:

- All foreign material that is created shall be captured/contained.
- Transparent materials used within an FMEA must be noticeably marked to ensure visibility.
- In activities that require grinding, machining, or lapping of valve seats, vacuum cleaning alone is not sufficient to ensure lapping compound or metal residue removal. Wipes or similar methods shall be used to ensure all grit and debris is removed to prevent intrusion into the system.
- When welding/grinding inside a system, ensure all welding residue (i.e., slag, grinding dust and spatter) is removed. This includes non-destructive examination residue.
- To the extent practical, stage tools and materials outside the FMEA. Packaging and similar materials should not normally be taken inside the FMEA.
- Clean all tools, parts, hoses, and tubing, etc., entering an FMEA of any debris or excess lubricant.
- To the extent practical, trash cans are not to be used or kept within the FMEA. Remove all trash as it accumulated from the FMEA.
- Ensure that hoses being connected to a system and containers being used to fill systems are cleaned/flushed prior to use.
- Ensure that hoses and/or tubing used for venting/draining are routed to prevent debris from being siphoned into a system.

ATTACHMENT 3

REGULATORY COMMITMENTS

SUMMARY OF EXELON COMMITMENTS
BRAIDWOOD AND BYRON STATIONS, UNITS 1 AND 2

The following table identifies commitments made in this document by Exelon. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"
A required reading package will be given to Shift Operations personnel. The reading package will reinforce training on indications available to operators and actions to respond to a post-LOCA ECCS sump screen blockage event. Training will discuss symptoms of pump cavitation (i.e., flow reduction, oscillating amps and discharge pressure) and will reinforce the expected action to shutdown the affected pump(s).	Reading packages will be completed by Sept. 8, 2003.
Operator simulator training will be completed in the third quarter of 2003 for Braidwood and in the fourth quarter of 2003 for Byron. As part of this training, NRC Bulletin 2003-01 is included as a debrief topic. The specific simulator scenario results in a complete loss of RHR, although not due to sump blockage. However, the end state, loss of recirculation capability, is the same as in an ECCS sump screen blockage scenario.	Braidwood - third quarter of 2003, Byron - fourth quarter 2003
The containment loose debris inspection procedures will be enhanced by incorporating specific references to potential debris sources (such as duct tape, masking tape, paper/plastic labels, stickers, excess sealant materials, foam ear plugs, Herculite, and insulation).	The procedure changes will be in place for both stations prior to their next refueling outages. Braidwood – by October 31, 2003 Byron – by September 15, 2003
Braidwood will revise the containment access procedure to ensure consistent implementation of the loose debris inspection procedure at both stations.	Complete by September 30, 2003
The containment loose debris inspection procedure will be enhanced to add the IMB access openings to the list of items that are inspected when a containment entry is made to elevation 377 feet.	The procedure changes will be in place for both stations prior to their next refueling outages. Braidwood – by October 31, 2003 Byron - by September 15, 2003

SUMMARY OF AMERGEN COMMITMENTS
THREE MILE ISLAND NUCLEAR STATION, UNIT No. 1

The following table identifies commitments made in this document by AmerGen. (Any other actions discussed in the submittal represent intended or planned actions. They are described to the NRC for the NRC's information and are not regulatory commitments.)

COMMITMENT	COMMITTED DATE OR "OUTAGE"
Licensed Operator Requalification Training is in progress and includes enhanced ECCS throttling criteria. All licensed operators will complete classroom training.	Complete before August 31, 2003
The plant will improve the containment closeout inspection procedure to specifically address dirt, dust, and small debris accumulation.	Complete by September 30, 2003
The plant will develop a specific procedure for cleaning and inspecting the floor drains in containment and will coordinate this work with the containment closeout procedure.	Complete by September 30, 2003